Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A method of simultaneously transmitting signals over a channel between a first device having N plurality of antennas and a second device having M plurality of antennas, the method comprising:

processing a vector **s** representing L signals $[s_1 \ldots s_L]$ with a transmit matrix **A** that is computed to maximize capacity of the channel by multiplying the vector **s** with the transmit matrix **A,** wherein the transmit matrix **A** is equal to **VD**, where **V** is an eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, **H** is the channel response from the first device to the second device, $\mathbf{D} = \text{diag}(d_1,\ldots,d_L)$ and $|d_p|^2$ is the transmit power for p = 1 to L; <u>and</u>

<u>transmitting with a power constraint for each individual transmit antenna path, wherein if $N \leq M$, then $\mathbf{D} = \mathbf{I} \cdot \text{sqrt}(P_{max}/N)$, with **I** as an identity matrix, such that the power transmitted by each of the N plurality of antennas is the same and equal to P_{max}/N; and if N>M, then $\mathbf{D} = \text{sqrt}(d \cdot P_{max}/N) \cdot \mathbf{I}$, such that the power transmitted by antenna i for i = 1 to N is $(d \cdot P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and $d_p = d$ for p = 1 to L.</u>

2. (currently amended): The method of claim 1, wherein the transmit matrix **A** is computed subject to <u>the</u> [[a]] power constraint.

Claims 3-7. (canceled)

8. (currently amended): The method of claim <u>1</u> [[7]], wherein <u>if N>M, then</u> d = 1/z and $z = \max_i \{(\mathbf{VV}^H)_{ii}\}$, such that the maximum power from any of the N plurality of antennas is P_{max}/N and the total power emitted from the N plurality of antennas combined is between P_{max}/M and P_{max}.

9. (currently amended): The method of claim <u>1</u> [[7]], wherein <u>if N>M, then</u> d = 1, such that the power emitted by antenna i for i = 1 to N is $(P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{max}/M.

10. (previously presented): The method of claim 1, and further comprising:

receiving at the M plurality of antennas signals transmitted by the first device; and

processing the signals received at each of the plurality of M antennas with receive weights and combining the resulting signals to recover the L signals.

11. (previously presented): The method of claim 1, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and wherein the processing comprises multiplying the vector **s** with a transmit matrix **A**(k) at each of a plurality of sub-carriers k.

12. (currently amended): A radio communication device for simultaneously transmitting signals over a channel <u>between N transmit antennas and M receive antennas</u>, the radio communication device comprising:

a. N plurality of antennas;

b. N plurality of radio transmitters each coupled to a corresponding one of the plurality of antennas; and

c. a baseband signal processor coupled to the N plurality of radio transmitters to process a vector **s** representing L signals $[s_1 \dots s_L]$ with a transmit matrix **A** that is computed to maximize capacity of the channel by multiplying the vector **s** with the transmit matrix **A**, wherein the transmit matrix **A** is equal to **VD**, where **V** is an eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, **H** is the channel response from the first device to the second device, $\mathbf{D} = \mathrm{diag}(d_1,\dots,d_L)$ and $|d_p|^2$ is the transmit power for p = 1 to L; and to transmit according to a power constraint for each individual transmit antenna path, wherein if $N \le M$, then $\mathbf{D} = \mathbf{I} \cdot \mathrm{sqrt}(P_{max}/N)$, with **I** as an identity matrix, such that the power transmitted by each of the N plurality of antennas is the same and equal to P_{max}/N; and if N>M, then $\mathbf{D} = \mathrm{sqrt}(d \cdot P_{max}/N) \cdot \mathbf{I}$, such that the power transmitted by antenna i for i = 1 to N is $(d \cdot P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and $d_p = d$ for p = 1 to L.

13. (currently amended): The device of claim 12, wherein the transmit matrix **A** is computed subject to the [[a]] power constraint.

Claims 14-18 (canceled)

19. (currently amended): The device of claim 12 [[18]], wherein if N>M, then d = 1/z and $z = \max_i \{(\mathbf{VV}^H)_{ii}\}$ such that the maximum power from any antenna of the N plurality of antennas is P_{max}/N and the total power emitted from the N plurality of antennas combined is between P_{max}/M and P_{max}.

20. (currently amended): The device of claim 18, 12 [[18]], wherein if N>M, then d = 1, such that the power emitted by antenna i for i = 1 to N is $(P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{max}/M.

21. (original): The device of claim 12, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and the baseband signal processor multiplies the vector **s** with a transmit matrix **A**(k) at each of a plurality of sub-carriers k.

22. (currently amended): A radio communication system for simultaneously transmitting signals over a channel between N transmit antennas and M receive antennas, the radio communication system comprising:

a. a first device comprising:

i. N plurality of antennas;

ii. N plurality of radio transmitters each coupled to a corresponding one of the plurality of antennas; and

iii. a baseband signal processor coupled to the N plurality of radio transmitters to process a vector **s** representing L signals $[s_1 \ldots s_L]$ with a transmit matrix **A** that is computed to maximize capacity of the channel by multiplying the vector **s** with the transmit matrix **A,** wherein the transmit matrix **A** is equal to **VD**, where **V** is an eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, **H** is the channel response from the first device to the second device, $\mathbf{D} = \mathrm{diag}(d_1,\ldots,d_L)$ and $|d_p|^2$ is the transmit power for p = 1 to L; and to transmit according to a power constraint for each individual transmit antenna path, wherein if $N \leq M$, then $\mathbf{D} = \mathbf{I} \cdot \mathrm{sqrt}(P_{max}/N)$, with **I** as an identity matrix, such that the power transmitted by each of the N plurality of antennas is the same and equal to P_{max}/N; and if $N>M$, then $\mathbf{D} = \mathrm{sqrt}(d \cdot P_{max}/N) \cdot \mathbf{I}$, such that the power transmitted by antenna i for i = 1 to N is $(d \cdot P_{max}/N) \cdot (\mathbf{V}\mathbf{V}^H)_{ii}$, and $d_p = d$ for p = 1 to L.

b. the second device comprising:

i. M plurality of antennas;

ii. M plurality of radio receivers each coupled to a corresponding one of the plurality of antennas; and

iii. a baseband signal processor coupled to the M [[N]] plurality of radio receivers to process signals output by the plurality of radio receivers with receive weights and combining the resulting signals to recover the L signals $[s_1 \ldots s_L]$.

Claims 23-26. (canceled)

27. (new): The system of claim 22, wherein if N>M, then d = $1/z$ and $z = \max_i \{(\mathbf{VV}^H)_{ii}\}$ such that the maximum power from any antenna of the N plurality of antennas is P_{max}/N and the total power emitted from the N plurality of antennas combined is between P_{max}/M and P_{max}.

28. (new): The system of claim 22, wherein if N>M, then d = 1, such that the power emitted by antenna i for i = 1 to N is $(P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{max}/M.

29. (new): The system of claim 22, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and the baseband signal processor multiplies the vector **s** with a transmit matrix **A**(k) at each of a plurality of sub-carriers k.